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SOME CONSTITUENTS OF YERBA SANTA.

By R. Rother.

A syrup prepared from Eriodictyon leaves is extensively used for the administration of quinine in a bitterless form. It also affords the further advantage of extinguishing the bitter taste of quinine when taken immediately after the use of mixtures in which it would otherwise be chemically incompatible. In order to disguise the bitterness of quinine when given in a fluid state, it has been variously exhibited in the condition of insoluble salts. The great objection to this mode of procedure is that these quinium compounds remain partially insoluble, and hence inoperative, in both alkaline and acidine contacts. Some of these combinations, although remarkably insoluble in the main, are by no means destitute of the nauseous bitter taint.

The important advantage possessed by Yerba Santa consists not only in the phenomenal suppression of the bitterness of quinine, but also in its presentation in a readily assimilable state.

A certain resinous component of Eriodictyon leaves is characterized by the property of forming in contact with some bases very soluble seemingly saline compacts. These, when merged with quinium salts generate by double decomposition an ordinarily insoluble quinium-resin salt. This compound is promptly decomposed by the stronger acids, and is peculiarly soluble in ammonia.

When coarsely ground Eriodictyon leaves are percolated with water, a moderately dark brown colored and somewhat bitter percolate is obtained. On evaporating this to a syrupy consistence and treating this residue with alcohol, a light brown liquor and dark brown pasty residue results. The alcoholic solution has acquired all of the peculiar bitterness of the percolate whilst the pasty mass is practically tasteless. On treating this residue, or the original one resulting from the percolate, with potassium carbonate, an ammoniacal odor becomes quite pronounced. The addition of an acid to the dark brown mass, separated by alcohol, yields a profuse precipitate which is wholly but slowly dissolved to a dark brown solution by a large volume of water.

When the residuary leaves in the percolator are treated with water rendered strongly alkaline with ammonia, the first portion of the new percolate is very turbid, but becomes clear as the free ammonia descends into the precipitate. A considerable proportion of alkaline menstruum is needed to extract the color-giving substance wholly. Evaporation of the percolate to a syrupy residue and treatment of this with alcohol, yields a brown red bitter solution, and a profuse dark brown precipitate. The solution and precipitate are in all respects identical to those obtained in the first percolation. The alcoholic solution contains the quinine precipitant in union with ammonia as an acidic salt. The addition of water causes a dense milkiness, and acidulation with a strong acid precipitates the acidic resin in curdy flakes. Excess of ammonia added to the alcoholic solution causes no precipitate, but the color is very perceptibly deepened. On exposure of this mixture the excess of ammonia and much of the alcohol is dissipated, whilst a red-brown tarry acidic ammonium salt deposits.

The precipitate given by alcohol appears to be an acidic ammonium salt of the tasteless and non-quinine precipitating acidic component of the leaves. When treated with water an inconsiderable proportion dissolves, leaving a large residue. Addition of ammonia or potassium carbonate and much water dissolves this wholly to a deep red-brown solution. The tinctorial power of this body is its most remarkable property. In its natural condition it is very probably in great part an acidic anhydrate, which is dissolved by aqueous solutions of alkalis and their carbonates. Under these circumstances no perceptible effervescence occurs, when carbonates are employed. With the use of monocarbonates the solution contains bicarbonate, showing that the reaction is like to that resulting in similar cases with analogous matter from other plants. On adding ferric chloride to such a solution, no precipitate at first appears. The continued addition of it, however, causes an abundant brown-black precipitate soluble to a great extent in an excess of the reagent. It is also partially soluble in ammonia with a deep red-brown color. The addition of ammonia to a mixture containing excess of ferric chloride gives a precipitate utterly insoluble in ammonia. These results show that the various proportions of the tinctorial body appended to basic radicles determine the degree of solubility and insolubility of the compound. As already stated, strong acids occasion a precipitate when added to alkaline solutions of this substance. Boiling of the mixture with dilute sulphuric acid appears to generate a new insoluble sub-

stance readily soluble in alcohol and in ammonia, with intense red-brown color. The solutions are characteristically tasteless.

The tarry acidic ammonium salt of the quinine precipitant is readily and perfectly soluble in a sufficiency of alcohol. It is also readily and completely soluble in excess of ammonia. When treated with ether, a portion of the acidic component is dissolved. A correspondingly less acidic salt, however, remains undissolved. The action of chloroform is precisely similar in this. The acidic resin thus separated has an all-proportional solubility in these menstrua. It remains as a green-yellow transparent mass after the spontaneous volatilization of the respective solvents. It reacts with monad monocarbonates, converting them into bicarbonates. It is readily soluble in bicarbonates, evolving no carbonic anhydrate except on heating. When the solution obtained with sodium bicarbonate, for instance, is evaporated, a portion of the resin separates and is readily taken up by ether or chloroform. Alcohol, however, dissolves an acidic sodium salt of the resin.

Treatment of Eriodictyon leaves with alcohol, dilute or strong, wholly removes the quinine precipitant. But this method of isolating it is neither economical nor practical.

A fluid extract of Yerba Santa limpidly miscible with simple syrup is a desideratum. The writer has heretofore employed ammonia as a part menstruum in preparing syrup of Yerba Santa. In order to secure an effective extraction an excess of ammonia is essential. It is difficult, however, to adjust a proper proportion, and hence the ammonia may preponderate in the finished syrup. The writer would suggest a fluid extract of Yerba Santa for preparing the syrup to be used in the proportion of one fluidounce for one pint of the syrup. This fluid extract is merely an alcoholic solution of normal potassium eriodictyonate uncontaminated by the dark colored non-quinine precipitant. The following is the process recommended:

Yerba Santa leaves, coarsely ground	16 Troy ounces.
Potassium carbonate	3 "
Ammonia water.	
Alcohol.	
Water.	Of each sufficient to make one pint.

Mix ammonia water and water in the proportion of one measure of the first and seven measures of the second. Mix the Yerba Santa with eight fluidounces of this mixture and pack it firmly into a

cylindrical glass percolator. After due maceration pour on menstruum until 3 pints of percolate has slowly passed. To this add the potassium carbonate and evaporate it until a pasty residue is left. Stir this well with 8 fluidounces of alcohol, gradually added; let the pasty precipitate subside and decant the supernatant liquor. To the residue gradually add 8 fluidounces of alcohol, as before, pour this mixture upon a strainer and force the liquid out. Should this second extraction measure more than is needed to complete the intended volume of fluid extract, dissipate the excess of alcohol by appropriate means; unite the residue with the first extraction, set the mixture aside for twenty-four hours, and decant the clear fluid extract from the scant crystalline deposit meanwhile formed.

CONSTITUENTS OF SOME AMERICAN PLANTS.

ABSTRACTS FROM THESES.

Mitchella repens, Lin.—An analysis of this plant was made by Edgar Breneiser, Ph. G., with the following results: Volatile oil was found to be absent. Petroleum-benzin dissolved 1·180 per cent., consisting of chlorophyll and wax, the latter saponifiable by alcoholic potassa solution. Ether took up 1·400, of which ·240 was soluble in water, and ·940 soluble in alcohol. The aqueous solution contained a principle precipitated by tannin and by picric acid, but neither alkaloid nor glucoside. The resin taken up by alcohol was soluble in potassa and this solution yielded nothing to benzin, benzol or chloroform; the liquid obtained on treating the resin with acidulated water, gave precipitates with tannin and picric acid, but yielded nothing to benzin, benzol or chloroform. The alcoholic extract of the plant amounted to 3·800 per cent., of which 3·440 was soluble in water, and this contained 1·630 glucose, estimated by Fehling's solution. Water now dissolved from the plant 20·699 per cent., from which alcohol precipitated 5.440 mucilaginous matter and ·536 inorganic compounds; the further addition of alcohol precipitated 3·679 dextrin and allied carbohydrates; 6·009 glucose was found; also a saponin-like principle (precipitated by baryta, and frothing in aqueous solution.) Dilute soda solution dissolved 2·360 albumin, 1·840 other organic matter and ·120 inorganic matter; total, 4·320 per cent. Di-

lute hydrochloric acid took up 4·418 organic and 2·820 inorganic matter, total 7·238. Treatment with chlorine occasioned a loss of 11·784 per cent.; the residue now weighed 33·460, and after deducting 11·240 for moisture in the drug, the loss not accounted for by the analysis, amounts to 4·879 per cent. The ash of the air dry plant weighed 5·440 per cent., only ·360 of which was soluble in water; the ash consisted of carbonates, chlorides, sulphates and phosphates of sodium, potassium, calcium, magnesium and iron.

Eupatorium perfoliatum, Lin.—The percentages of extract obtained from this plant by the successive treatment with different solvents, has been ascertained by Oscar F. Dana, Jr., Ph. G. The results are as follows: moisture 10·50, extract by petroleum benzin 3·80, by ether 4·60, by alcohol 33·80, by water 24·80, by alkali 5·80, cellulin 11·70; loss by treatment with chlorine, &c. 5·00. The ash amounted to 8·3 per cent. Crystals were observed in the benzin extract, and were prepared in larger quantity, by exhausting the plant with alcohol, treating this extract with ether and the ethereal extract with benzin. Thus obtained the crystals were still impure and were not further examined.

By the same process these crystals were obtained by G. Latin, (Am. Jour. Phar. 1880, p. 392,) who succeeded in obtaining them white and showed them to be wax or possibly resin. The bitter principle has been obtained by Latin in a pure or nearly pure condition and found to be a glucoside; he states it to be soluble in ether, while according to M. Parsons (Am. J. Ph., 1879, p. 342,) it is insoluble in the menstruum named.

Leptandra virginica, Nutall.—To obtain the bitter principle, Gust. Steinmann, Ph. G., poured the concentrated tincture into water, and agitated the acidulated aqueous solution with petroleum benzin, benzol and chloroform; only the benzol liquid yielded a residue which was crystalline. 500 gm. of the drug yielded only 0.5 gm. of the crystals, which after recrystallizing from ether, were of a pale lemon-yellow color, of a peculiar agreeable-odor, and of a very bitter taste. They were found to be insoluble in petroleum benzin, soluble in alcohol, ether and benzol, less freely soluble in cold water, not precipitated by Mayer's solution or by tannin, and not yielding glucose on being boiled with dilute sulphuric acid. The resinous matter precipitated by water from the alcoholic extract, loses the bitter taste almost completely by repeated solution and precipitation.

Catalpa bignonioides, Walter.—The seeds were examined by Fred. K. Brown, Ph. G., who demonstrated the presence of resin, fixed oil, tannin and sugar, and on distilling with water, obtained a distillate having somewhat of a rancid odor. Two crystalline bodies were obtained by treating the powdered seeds with a mixture of ether, alcohol and ammonia, acidulating the concentrated filtrate, removing oil and other impurities with ether, neutralizing with ammonia, and agitating with a mixture of ether and chloroform; on evaporating the ethereal solution, needles were left, which were soluble in alcohol, ether and chloroform, insoluble in water, almost tasteless and after boiling with dilute sulphuric acid did not reduce Fehling's solution. The aqueous liquid, left after treatment with ether and chloroform, yielded crystals, which must have contained ammonia sulphate, and possibly also a glucoside, since after boiling with sulphuric acid, a reaction with Fehling's solution was obtained.

Ilex opaca, Aiton.—On treating the leaves with benzin, Walter A. Smith, Ph. G., obtained 1.2 per cent. extract, of which .088 was volatile and had an acrid mustard like odor; the remainder consisted of fat and .152 wax. Ether extracted 4.5 per cent. .5 of which was soluble in water, the remainder being resin soluble in alcohol; the aqueous solution had a bitter taste, and from its behavior to Fehling's liquid appears to contain a glucoside. Tannin and chlorophyll were found in the alcoholic tincture. The leaves yielded 4.5 per cent. of ash.

Gymnocladus canadensis, Lamarck.—Samuel S. Mell, Ph. G., observed that the seeds weigh on the average 30 grains, contain 8.5 per cent. of moisture, and yield 2.75 per cent. of ash. Petroleum benzin extracts about 10 per cent. of fixed oil, which is yellowish, saponifiable, and of the spec. grav. ·919. Ether extracts a little wax, fat and resin. The alcoholic extract amounts to 3.25 per cent. and contains a little tannin and a small quantity of glucoside which can be removed from the aqueous solution by chloroform, and which appears to be present also in the immature fruit; it has a peculiar odor and an acrid burning taste. The seeds contain also mucilage, starch and albuminoids.

EXTRACTUM PRUNI VIRGINIANÆ FLUIDUM.

By Cyrus M. Boger, Ph. G.

Read at the Pharmaceutical Meeting April 19, 1887.

Perhaps no other drug in the pharmacopœia has been investigated as much and written upon as often as Wild Cherry Bark.

While many valuable additions have from time to time been made to our knowledge concerning it, yet its preparations remain for the most part unsatisfactory.

The design of this paper is the discussion of its fluid-extract; the chief objects to be attained in making this are:

1. To develop all the hydrocyanic acid the bark is capable of yielding.

2. To have as little tannic acid present when finished as possible.

3. To have it free from a precipitate—The U. S. Pharmacopœia process fulfils none of these requirements; why does it not?

1. Because the time allowed for maceration is too short.

2. The addition of glycerin hinders the development of prussic acid during maceration.

3. The drug is not moistened sufficiently to develop all the acid.

Experience has proven that sixty hours at least must be allowed for the full development of the acid, and that seventy-two hours is not too long.

The viscidity and therefore the immobility of a liquid materially affects the rapidity of chemical action; the advantage to be gained from the addition of glycerin to the macerate is therefore not apparent and experience has shown its influence to be inimical in this process.

The hydrocyanic acid does not develop well when the bark is not moistened sufficiently, any more than it does when made too wet; actual practice has shown that the U. S. Pharmacopœia process does not allow sufficent moistening. Just here it may be remarked that after the addition of the macerate the bark should not be packed at all but put loosely into a percolator until it is time to pack it for the percolation.

The matter of tannic acid has puzzled a great many persons and it is quite enough to say that the addition of a large quantity of glycerin to the formula has not reduced the amount dissolved, even if it has helped to hold it in solution; seeing that the acid is freely soluble in both water and alcohol there is little hope that very much can be ac-

complished in the direction of ridding the product of this constituent of the drug, unless indeed we should have resort to an expedient of perhaps questionable propriety and add to the macerate a small quantity of some acid, thus rendering the tannin less soluble; experiments in this direction have however not been made.

The presence of a precipitate is due to the fact that the menstruum of dilute alcohol is not allowed to thoroughly mix with the macerate before percolation begins, thus the first part of the percolate differs from the last part; this must naturally cause a precipitate.

The following formula has yielded excellent results and develops all the prussic acid; there is no precipitate nor does any form on standing as will be seen from the specimen which is seven months old and has never been filtered; and I had a specimen, which has unfortunately been mislaid, which was over a year old and is identical in appearance and odor with this:

Take of Ground Wild Cherry Bark	℥xvi.
Water and Alcohol, each	f℥x.
Glycerin	℥iv.

Moisten the bark with ℥x of water and put loosely in the percolator, close tightly and allow it to macerate sixty hours; then pack very firmly, mix the ten fluidounces of alcohol and four of glycerin and pour it upon the bark, now cork up the percolator tightly and macerate twenty-four hours longer; at the expiration of this time remove the cork and about twelve fluidounces of percolate will come through; water should now be poured on to force the other four fluidounces out when the percolation should be stopped and the product will be finished. After an extended experience the conclusion was reached that to continue the percolation beyond this point is worse than useless as it necessitates subsequent evaporation; nor does it add any medicinal strength to the preparation. It does add quite a considerable quantity of tannin and gallic acid, which latter results from the conversion of the tannin by heat.

EMULSIONIZING OF CHLOROFORM AND ETHER WITH GUM ARABIC.

By T. S. Wiegand.

Read at the Pharmaceutical Meeting April 19, 1887.

Having frequent occasion some time since to prepare mixtures of chloroform with gum arabic I was much annoyed by the customer complaining that it was not always the same strength when I was positive that the prescription was dispensed by a careful and skillful operator; this was only to be accounted for by the escape of the chloroform owing to its great volatility while being emulsionized. Seeking to avoid the complaint I was led to try a number of experiments, and tried mixing it in the method so successfully adopted for emulsions of oil of turpentine, viz.: that of putting the powdered gum in a dry bottle, pouring on the chloroform, shaking them thoroughly, and then adding the water with constant shaking. While this completely mixes the chloroform it does not remain as a full, well-mixed emulsion, but separates into two layers, a white thick one which contains the gum and chloroform and a clear thin one mostly of water only. When making a mixture containing ether the result was quite different, the gum being put, as before, in a dry bottle, the ether added and lastly the water—an emulsion was effected very quickly and it was nearly transparent; upon standing a separation took place, the gum and ether rose to the surface as a transparent layer and under it the water; these were very easily mixed by simply shaking and a complete suspension of the ether was effected.

The advantages of this process are two-fold, the rapidity by which it can be effected, and the certainty of the mixture being always uniform.

This process is almost identical with one proposed by Prof. Parrish and printed on page 189 of volume A. J. P. for 1872.

In this connection it is well to state, for the benefit of the younger pharmacist, that in those cases where a large number of *drops* of very volatile liquid is ordered, that it is better to drop some even part of the number into a minim measure and note the number of minims and then measure the proper quantity, as in this way the danger of mistakes in counting is avoided and also the loss that occurs by evaporation while counting.

SYRUP OF TOLU BY A NEW PROCESS.[1]

By Frederick Stephenson.

There are various published formulæ for the preparation of this syrup, the more important of which are as follows:—

1. The B. P. formula in which the balsam is ordered to be boiled with water for half an hour in a lightly covered vessel, filtered when cold, and the sugar dissolved in the filtrate by the aid of heat.

2. The former United States Pharmacopœia formula, in which tincture of tolu is rubbed up with the carbonate of magnesia, a little sugar and water, filtered, and the sugar dissolved in the filtrate by the aid of the heat.

3. In the French Codex the balsam is ordered to be digested for two hours with one half of the water at the temperature of a water bath. It is then re-digested with the other half in the same way, the mixed liquids cooled, filtered, and the sugar dissolved by the heat.

4. In the 1883 United States Pharmacopœia the balsam, sugar and water are ordered to be digested in a covered vessel for two hours at a temperature not exceeding 180° F., and strained through a wetted muslin strainer when cold.

The chief object to be aimed at in syrup of tolu appears to be to secure the full flavor of the balsam which is said to be due to tolene, cinnamate of benzyl and benzoate of benzyl, all of which are volatile liquids. It also contains doubtless small quantities of cinnamic and benzoic acids, but these do not appear to be of primary importance. On this account all the above formulæ strike one as more or less faulty.

Any one who has made the syrup by the first process must have felt that the boiling caused a considerable loss of volatile odorous principles. The second process is also faulty for the reason that the carbonate of magnesia retains some of the volatile constituents as well as cinnamic and benzoic acids. It also renders the syrup slightly alkaline and, therefore, incompatible with alkaloidal salts.

The third and fourth formulæ, though perhaps a slight improvement on the first, are still open to the objection of employing too much heat. For the fourth process the advantage is claimed that the sugar aids solution of the aromatic principles, but it is open to the objection that a strong syrup is very difficult to filter bright.

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[1] Read before the Pharmaceutical Society of Great Britain at an Evening Meeting in Edinburgh, Wednesday, March 16.

In addition to the above formulæ it appears to be a very common practice to use one or other of the many concentrated liquors which are added to simple syrup in the proportion of 1 to 4. It is impossible to have a syrup answering to the official specific gravity by this method, and, so far as I have seen, the syrups so made are either very deficient in flavor, or possess a flavor other than the correct one.

It had often occurred to me that the balsam might be sufficiently exhausted by cold maceration, if the tolu was in a fine state of division, and the syrup completed without the application of heat; and the following is the result of a few experiments by way of putting this idea to the proof. I proceeded as follows:—

Take of—

Balsam of tolu	1½ oz.
Finest loaf sugar	2 lbs.
Water	16 ozs.

Reduce the balsam to powder by trituration with 8 ozs. of the sugar. Place them in a bottle with the water, and macerate for forty-eight hours with occasional agitation. Then filter through paper till bright, and dissolve the remainder of the sugar in the filtrate. This is best done by crushing (not powdering) the sugar, placing it in a percolator and passing the filtrate through. The result is a clear and very full flavored syrup, which I think compares favorably with the product of any other published formula. It takes slow percolation to dissolve all the sugar unless the percolator is placed in a moderately warm place, but it might be worth considering whether so large a proportion of sugar is necessary. It is also a little difficult to completely clarify the syrup, and any suggestion in that direction would be an improvement.—*Phar. Jour. and Trans.*, March 26, 1887., p. 785.

BLAUD'S PILLS.[1]

By W. Duncan.

Three months ago the query, "What is the best method for making Blaud's Pills?" was put to me at one of the meetings of our Association, and knowing that great diversity of opinion exists among us as to the "best" method of preparing the same, I thought the subject a very suitable one for a short paper. Having procured

[1] Read before the Edinburgh Chemists' Assistants' Association. Reprinted from *Phar. Jour. and Trans.*, March 19, 1887, p. 775.

in all nine samples of the pills, I estimated the amount of iron present in the ferrous state, calculating it as carbonate.

A contained	14·9	per cent.	$FeCO_3$
B "	14·25	"	"
C "	22·0	"	"
D "	19·49	"	"
E "	20·1	"	"
F "	15·4	"	"
G "	9·9	"	"
H "	14·5	"	"
I "	10·0	"	"

These samples, with the exception of G and I, were to all outward appearance passable pills, although some would have been greatly improved if a little more care had been taken in rounding them off with the pill finisher. G and I fell to powder when pressed between the fingers. C and E must have been made with dried sulphate of iron, as the theoretical percentage of $FeCO_3$ in a mass made with 50 per cent. $FeSO_4 7H_2O$, the usual strength, is only 20·8 per cent., providing no oxidation has taken place, a thing which is absolutely impossible if you attempt to form the ferrous carbonate in the mortar. Of course I am perfectly aware that many pharmacists believe the proper course to adopt in making Blaud's Pills is to hinder chemical action as much as possible, trusting to the reaction taking place in the stomach while the pill is being disintegrated; but I do not think that was the intention of the originator of these pills, neither do I think the majority of us follow out that idea in preparing them. We have no right to take for granted that $FeCO_3$ is formed in the stomach, while we all can see for ourselves that it is in the mortar. Inquiries at the various shops where I was supplied with specimens elicited the following amusing differences of opinion regarding their preparation. One gentleman tells me he dries separately the iron sulphate and potass. carbonate, mixes the iron with one-sixteenth of its weight of tragacanth, adds the potass. salt and beats into a mass with treacle. His intention is to prevent chemical action between the salts as much as possible.

Another dissolves 2 oz. $FeSO_4$ in hot water, and the same quantity of K_2CO_3, mixes the solutions and evaporates to dryness, making up to 4 oz. with equal weights of pulv. acacia and liquorice. They are then massed with glycerin and syrup. This

process I believe yields the minimum of $FeCO_3$. Still the pills seem to be as good medicinally, and no fault has been found either by prescribers or patients. As a matter of fact, Mr. Hill tells me he has known of pills which contained not a trace of ferrous iron, and yet were said to act as rapidly on the system as the others. Another gentleman takes 1½ oz. dried $FeSO_4$ and the same quantity of K_2CO_3, mixes them, adding 1 oz. pulv. acacia, and beats into a mass with simple syrup, cutting into four-grain pills. After standing for some time to harden, he varnishes them with solution of tolu in ether. They are certainly beautiful pills to all outward appearance; but here again he believes the stomach to be the proper place for the chemical reaction between the salts, not the mortar. He has great faith in his own method, and tells me that a customer of his who had gone to the south of England asked her chemist there to send to Edinburgh for A.'s compressed Blaud's Pills. Others either made them by Martindale's or Ince's formula; two I think by simply rubbing the two salts together, and adding tragacanth q. s. to the liquid mass to give it a proper consistency.

Wishing to test the keeping properties of pills made by the methods followed, I made two dozen each from Mr. Ince's formula, Mr. Martindale's and the old way above described. All were made the same night, and estimated with $K_2Cr_2O_7$, using sulphuric acid as a solvent, and checking the results by duplicate estimations, using H_3PO_4 as a solvent to avoid the action of the sugar influencing the conversion of the ferrous to ferric salt. As a matter of fact, the difference between the four estimations was very slight (two with H_2SO_4 and two with H_3PO_4). The following is Mr. Ince's method:

R	1	Ferric sulph.	℥ss.
		Glycerin (hydrated)	♏iij.
	2	Potass. carb.	℥ss.
		Glycerin	♏ij.

Mix 1 and 2 separately on a slab with glycerin, then mix together in the mortar, add p. tragacanth, gr. vj, and divide into twelve pills. In this formula K_2CO_3 is very much in excess of what is actually necessary for the conversion of the $FeSO_4$ into $FeCO_3$, the 30 grains $FeSO_4 7H_2O$ requiring only 16 grains of anhydrous K_2CO_3, equal to about 20 grains of the B. P. salt, which contains 16 per cent. H_2O. Mr. Martindale says that a pill made with equal quantities of the two

salts will be sure to deliquesce, and in the "Extra Pharmacopœia" recommends the following improved formula:

R	Ferri sulph.	2½ grs.
	Potass. carb.	1½ grs.
	Sacchar.	1 gr.
	Pulv. trag.	½ gr.

I also made two dozen by Martindale's formula, but used a little glycerin to rub up the salts, as in Ince's.

The following are the percentages of $FeCO_3$ in the fresh pills:

	$FeCO_3$ per cent.
No. 1 (Ince's formula)	17.9
" 2 (Martindale's)	17·0
" 3 (Martindale's formula, but Ince's mod.)	19·5
" 4 (with tragacanth only)	16·5

These four sets were laid aside in ordinary chip boxes for two months, the boxes during that time being occasionally opened. They were then carefully examined and estimated. No. 1 (Ince's) were quite hard, and seemed as good as the day they were made.

No. 2 (Martindale's) were very slightly marked with damp-looking patches, the pill powder (pulv. amylic. 5 per cent. trag.) being slightly caked on them.

No. 3 were very soft, and altogether unsightly from absorption of moisture, although the glycerin used in them was hydrated, as recommended as not being hygroscopic.

No. 4 were quite dry and round, but fell to powder when pressed between the fingers.

On being estimated—

No. 1 contained	13·73	per cent.	$FeCO_3$
" 2 "	18·3	"	"
" 3 "	18·8	"	"
" 4 "	11·7	"	"

One pharmacist tells me he had the same difficulty with the pills made from Martindale's formula, namely, sweating, and suggested sugar of milk to be used in place of cane sugar. This, I find, is an improvement only in appearance, for on estimating pills in which the same quantity of iron was used to begin with, and which had been kept a month, I found that they only contained 12·2 per cent. $FeCO_3$.

From these experiments I have come to the conclusion that Martindale's formula is the one that should be adopted by those of us who

believe Blaud's Pills should be really a preparation of $FeCO_3$, and not a preparation of $FeSO_4$, intended to form the carbonate in the stomach under the assumption that the same reaction goes on in that place as in a glass measure. Their tendency to sweat would be overcome, I think, by varnishing them in tolu and ether, although I have not had time to test the value of that suggestion. Is not this a subject suitable for the B. P. C. Formulary Committee to take under their consideration, and give us an official formula, if not a B. P. one?

NOTE BY THE EDITOR.—A formula similar to that of Mr. Martindale's was published in AM. JOUR. PHARM., 1871, p. 307. For other formulas consult this JOURNAL, 1871, pp. 373 and 471; 1872, pp. 12 and 282; 1876, p. 492; 1880, p. 87; 1882, p. 39; 1883, p. 141; 1885, p. 595.

PRACTICAL REMARKS ON PEARL-COATING OF PILLS.[1]

BY WILLIAM GILMOUR.

Pearl-coating has developed to a most extraordinary extent within the past few years, and at the present time is fast revolutionizing the pill-making department of the pharmacist's work. I am very sorry for this, for I quite foresee that in allowing this department to pass into the hands of large manufacturers we are fast drifting on to another rock not less serious than the patent medicine one. This subject is too acute for me to dwell upon at the present time, but let me point out in justification of what I have hinted at that while it is highly improbable that grocers and general dealers will be at the trouble and expense (even were it legal) to buy, spell out and consult the Pharmacopœia for the purpose of making pills, and afterwards coating them, there is nothing remotely improbable in them buying from the wholesale manufacturers, and successfully competing with the more highly educated pharmacist. I do not want to make more of this point than is necessary. It is only because I see clearly both the weakness and strength of our position, and in the hope of strengthening our weakness that I refer to it at all.

The first thing that I would notice in pearl-coating is that it in-

[1] Read before the Pharmaceutical Society of Great Britain at an Evening Meeting in Edinburgh, Wednesday, March 16.

volves a new departure from the modern tendency and spirit of the Pharmacopœia. Every recent change in the formulæ for "pilulæ" has been in the direction of producing a mass at once firm and plastic, and which would at the same time prevent the pills from getting too hard on keeping. Now the only element of success in pearl-coating, so far as my experience goes, is to have a hard dry pill to begin with. Beyond this and a little common sense to adapt quantities, and a little muscular exertion, there is nothing about the process which a child could not perform. But notice how the condition of hardness and dryness just mentioned agrees with the officinal formulæ. In the Pharmacopœia, there are in all, I think, twenty-one different "pilulæ," and of these fully one half contain ingredients which are utterly incompatible with pearl-coating. There are, for example, seven different masses made with such hygroscopic substances as glycerin and treacle; there are other four containing essential oils and other elements equally unworkable, and I venture to say that no human ingenuity will pearl-coat the pills made from such masses, and at the same time adhere both to the letter and spirit of the Pharmacopœia. But if Mahomet does not go to the mountain, the mountain must go to Mahomet, and so the difficulty has been bridged over—But how?

A second point which I would notice is the amount of French chalk required in this process. From a series of experiments which I have made, I find the amount required ranges from twenty to thirty per cent. of the weight of the pills coated. This makes a considerable increase both in the size and weight of the old 5 grain pill, and suggests, by the way, an increase in the size of the pill boxes in general use. It is not for me to say what the physiological effects of fifteen or twenty grains of an insoluble silicate per day may be on the human economy, particularly if continued for a length of time, as in the case of Blaud's pills, but it at least suggests the careful examination of the chalk used, in case of its contamination with any deleterious substance. This large amount of chalk may be increased at pleasure. If the liquid with which the the pills are damped be too thick, or if too much be added, more chalk will be required, and the pills will be heavier and larger. Even ten per cent. of an increase by weight of chalk is not a bad profit were we to sell the pills by weight, but as we only retail them by number the hint is probably thrown away.

The three great difficulties which pharmacists will, however, probably require to face as regards successful pearl-coating, are "pitting," "fall-

ing" and "discoloration," and to each of these a word. I have made a distinction between pitting and falling, as I look upon them as different troubles proceeding from distinct causes. Pitting gives the pills all the appearance of dried peas, while falling simply flattens them on the point of the rest. Pitting in its worst form, I think, occurs in the compound colocynth pill, and therefore it may be taken as typical. It is generally ascribed to the resin of scammony, and, certainly, since the resin has been substituted for scammony the evil has increased. Still, other pills containing no resin of scammony undoubtedly pit also, and, therefore, I am inclined to look upon it more as an aggravating cause. As a rule, it will be found that all pills containing aloes, resins or gum resins in excess have a tendency under certain circumstances to pit. What are these circumstances? A theory was given me the other day which I may here throw out, although I have had no opportunity of verifying it. If the essential oil be added to the resin of scammony (reverting to the colocynth pill) before all the ingredients forming the mass are mixed—in other words, if the ingredients are thrown separately into a mortar and the oil of cloves added before mixing, the probability is that the oil might come in direct contact with the resin, and would, in some way, act upon it so as to change its physical properties, and prevent it again immediately hardening. There is this to support the theory, that even with the same ingredients the mass at different times exhibits different properties directly affecting the pill. This, in my experience, applies not only to the colocynth pill mass, but to others, also, which pit more or less on keeping. A soft aloes or a soft resin or gum to begin with, and an overworking of the mass, either with the pestle or the hands, produce very much the same results. In the case of the colocynth pill, if soap is substituted for sulphate of potash the tendency to pit is greatly lessened. I am no advocate for tampering with officinal formulæ, but sulphate of potash is really not required in the present pill, while soap, to my mind, is in every way an improvement.

Add to this suggestion a little care in securing hard dry aloes and resin of scammony, and also in forming a mass neither too hard nor too soft, and the trouble should be reduced to a minimum.

Falling will occur in almost any pill if made too soft, but I refer at present to falling from one peculiar cause, not generally noticed, namely friction. If you want a colocynth pill that will fall, use the rounder or finisher with all your might. Pills that require to be coated, re-

quire to be dry and hard. Of course they are rounded from time to time, each time probably as they get harder with increased friction, and so the mischief is done. In a short time the pills assume all forms as if they were not on good terms with each other. I have always attributed the peculiarity to the heat produced by the friction, and the cure is a little more care in finishing, so as not to require too much of the rounder, and a little attention to frequent shaking during the process of drying.

Discoloration however, is probably the most fertile cause of annoyance to be met with in pearl-coating, and as you know the predisposing causes to discoloration, I need not dwell upon them. As I have already said, I am no advocate for substitution in officinal formulæ, but the difficulty must be bridged over. Fortunately it is here if anywhere that the pharmacist stands strongest. He does not require to stock his pills for twelve months, or even for six months. He has only to stick to the proper formulae, dry them in the usual manner, coat them, and see how long they will keep, and prepare his stock accordingly. This is troublesome. Of course it is, but we need not expect to get any great good in this world without trouble. I would much prefer myself to mass comp. rhubarb pill with water rather than glycerin, and do many other things not directed in the Pharmacopœia, but I do not see any change which I can make in this direction that would not in the end be to my own prejudice. I know some laugh at the idea of pills losing any of their active properties by the process of hardening, but I have proofs too abundant to doubt the fact for one moment. In the majority of cases the loss may not be noticed, but take an active cathartic pill such as the colocynth, and its action is not only greatly retarded, but also very much impaired.

The drying of pills must always be looked upon as one of the most important parts of the process. I have tried various plans, but have always come back to the old plan of drying on trays in a dry room.

The pills are ready for coating whenever thoroughly dry on the outer surface, and while still a little soft towards the centre. In this state they will not keep long, but they will retain their maximum of activity.

In connection with the subject, I may mention that a gentleman, I believe known to you all (Mr. W. L. Howie), the end of last year worked out a process of giving to pearl-coated pills the character and sweetness of sugar by the use of Fahlberg's coal tar saccharin. I have

seen some of the pills coated in this way, and from the great sweetening power of saccharin it seems admirably adapted for this purpose. Mr. Howie, I must tell you in case any one should be too enterprising, has patented his process, and I understand the patent covers the use of saccharin in all descriptions of coated pills as well as capsules.

I had intended to touch upon the coating of some extra-pharmacopœia pills, such as "Blaud's," but I am afraid I have already extended my remarks to too great a length. You will quite understand from the current of my remarks that I am not altogether in favor of pearl-coating. They may give you the necessary impression that I am more averse to the process than I really am. It has its objections, and these I have tried to put before you. It has one other characteristic still, namely, that it makes a good made pill look much better, and a bad made pill look much worse, and this last feature I look upon as the most important, seeing that there should not be such a thing as a bad made pill put out of our hands.—*Phar. Jour. and Trans.*, March 26, 1887., p. 781.

A NOTE ON COMMERCIAL HYPOPHOSPHOROUS ACID.[1]

By George Lunan.

Solution of hydrogen hypophosphite or hypophosphorous acid is not an official substance, but the inclusion of the calcic and sodic salts in the Pharmacopœia and the prominent place which it occupies in published formulæ for the preparation of compound syrups of the hypophosphites warrant its being included in the category of officinal preparations. The acid, although containing three hydrogen atoms in the molecule, is monobasic, only one of these being replaceable by metallic bases, and as a consequence the formula is always written HPH_2O_2 and not H_3PO_2.

It is the least oxygenated phosphorus acid, containing one atom less oxygen than phosphorous acid, and two less than phosphoric, in the molecule.

Procter in 1858 recommended for its preparation the decomposition of 480 grains of the calcic salt by 350 grains of crystallized oxalic acid, making saturated solutions of each; mixing, filtering and evaporating the filtrate to eight and a half fluidounces, when the solution would contain 10 per cent. of the acid.

[1] Read before the Edinburgh Chemists' Assistants Association, reprinted from *Phar. Jour. and Trans.*, March 19, 1887, p. 773.

In Parrish's "Pharmacy" this formula is reproduced in detail, 350 grains or a sufficiency of crystallized oxalic acid being specified. Attfield, in his latest edition, says "it may be prepared by decomposing the calcium salt by oxalic acid, or, better, the pure barium salt with sulphuric acid."

Watts' "Inorganic Chemistry" recommends the decomposition of the baric or calcic salts with sulphuric acid, and Watts' "Dictionary of Chemistry," the baric salt with sulphuric acid, or the plumbic salt with sulphydric acid.

It will thus be seen that there is a variety of methods for the preparation of hypophosphorous acid. Commercially, however, the method recommended originally by Procter is the one, I think, in general use. At least, if any reliance can be placed on the result of the experiments about to be summarized, this would seem to be a logical conclusion, as both calcium and the oxalic radicle were proved to be present in every sample examined.

As the solution that suggested this note was evidently much stronger in acid than would result from its preparation by Procter's formula, I resolved to obtain supplies from different sources, merely asking for hypophosphorous acid, without demanding a certain percentage, and in that way making comparisons, with regard to their strength and impurities, of which something had been foreshadowed by the original solution. In attempting to deal with these samples as types of the acid of commerce, I wish to preface the communication of the results by stating that I am well aware that there is such a thing as medicinal purity comparable to chemical. To be more explicit, that economic considerations are as worthy of practical application by manufacturing chemists as by others, and that it is unnecessary to free a commercial drug from a non-injurious impurity contained only in small quantity at the cost of doubling the price of manufacture.

Samples A and B were obtained from wholesale drug houses of first-class repute.

C was prepared by myself, using 12·6 grams of pure recrystallized oxalic acid, and instead of 17 grams of pure calcic hypophosphite as the molecular weight would require ·5 gram more (so as to insure, if possible, the absence of oxalic acid in the resulting solution), dissolving separately, mixing, filtering, washing and evaporating the fluid until it weighed 132 grams, when it should have contained 10 per cent. of the acid.

D was a sample kindly furnished me by a retail pharmacist in town. The time at my disposal would not admit of an examination of more, but I believe the above are typical of the commercial article.

The tests to which each sample was subjected, were;

1st. A solution of calcic acetate containing excess of acetic acid to detect oxalic acid or other oxalates.

2nd. A solution of ammonium oxalate to detect calcium salts.

3rd. A solution of plumbic acetate containing excess of acetic acid to detect phosphorous acid, or other phosphites.

I relied on the last test, from the fact stated in Watts' "Dictionary of Chemistry," that phosphite of lead is insoluble in acetic acid.

As these were likely impurities from the known methods of preparation, more attention was devoted to them than others.

In making qualitative estimations, the *modus operandi* consisted in adding to a small quantity of the sample the calcic acetate solution. In none of them was there an immediate precipitate, but on gently heating, or by merely stirring, a characteristic one began to appear in every sample more or less abundantly.

The ammonium oxalate reagent at once produced a precipitate in them all, and, as this seemed to indicate that the oxalic radicle was contained as calcium salt dissolved by the acid, each solution was neutralized by AmHO, and filtered from the precipitate, which formed in every case, care being taken to use a sufficiently diluted solution. The precipitate was examined, and found to consist of calcium oxalate in every case.

The filtrate was tested for the oxalic radicle in the usual way, and for calcium.

The oxalic radicle being absent, the filtrate was tested after an excess of acetic acid had been added by the acetate of lead reagent.

Of other impurities there were none likely and none found in sufficient quantity to warrant notice.

The results are tabulated below:—

Sample.	CaC_2O_4	Excess of oxalic acid.	Excess of $Ca2PH_2O_2$	H_3PO_3
A .	Abundant	Absent	Abundant	Absent
B .	Present	Absent	Present	Trace
C .	Present	Absent	Abundant	Absent
D .	Present	Absent	Present	Absent

Comment or inference from these will be left over until the quantitative analyses have been stated. The specific gravities were taken

at 60° F. The neutralizing power, not a very reliable test with a readily oxidized acid like hypophosphorous acid, was determined by a quarter normal solution of NaHO, using methyl orange as an indicator.

Ten cc. of the samples were diluted to 500 cc. with distilled water. Ten cc. of the ¼th NaHO standard solution, which would contain ·10 gram of NaHO equal to neutralizing ·165 gram of hypophosphorous acid, were taken, so that the quantity of the diluted sample required to neutralize this contained ·165 gram of the acid. In the case of sample A 25 cc. of the 1 in 50 solution were required, which would be equal to ·5 cc. of the original sample, the specific gravity of which was 1·332, so that it would weigh ·5666 gram, and if that contained ·165 gram of acid a rule of three sum decided that the percentage was 29·12. In making these volumetric estimations the ordinary method, that of running the standard solution into the sample, was not followed, it being thought that having the more dilute solution in the burette would give more exact results. Also that the indicator would be altered by remaining for any length of time with an excess of so powerful a reducing acid as hypophosphorous.

Practically, however, both methods yielded similar or very nearly similar results.

As it was thought that the determination of the reducing power of the samples would be a truer criterion, a process easily applied was looked for.

A standardized solution of $KMnO_4$ would, it was thought, admirably suit the purpose.

Various experiments were then made in the acid solution and neutralized, but after a series of heart-burnings it was found that the process would not work practically.

Though there can be no doubt that the official hypophosphites can be readily and easily determined by this method it must be borne in mind that in these cases known quantities are operated upon, and the end of the reaction can be ascertained only by filtration. The idea of using $KMnO_4$ was therefore abandoned, and fortunately for me the resources of chemistry were not exhausted. In "Watts' Dictionary of Chemistry" a process founded on the power of hypophosphorous acid of reducing $HgCl_2$ to HgCl was unearthed. It consists in adding a known quantity of the sample to an excess of mercuric chloride, acidifying with a small quantity of HCl, keeping the solution at a

temperature of 60° C. for some time, then throwing on a tared and dried filter, washing, drying at 100° C., and weighing the calomel. The equation is $H_3PO_2+4HgCl_2+2H_2O=H_3PO_4+4HgCl+4HCl$. It was specified in the process that the temperature must not exceed 70° C., as in that case some of the calomel might be reduced to the metallic state. Practically, however, it was found that barely one-half of the reducing power of the samples was exhausted by digestion for nearly an hour at 60° C. A quantity of the acid heated to 100°C. with excess of $HgCl_2$ produced a white precipitate which showed no signs of reduction, either to mercurous oxide or to metallic mercury, and as it was proved that the filtrate could be boiled indefinitely without producing the slightest further precipitation it was deemed that this process would work practically with the alteration of the digestion at 60° C. to heating to the boiling point 100° C.

As an example of this process 20 cc. of a solution of sample (A) containing 10 cc. in 500 cc., which would be equal to ·4 cc. of the original solution, weighing (seeing the specific gravity was 1·1332) ·45468 gram, was taken; to this was added a known excess of 5 per cent. solution of $HgCl_2$, 3 cc. of HCl, and the whole diluted to about 100 cc. with distilled water, and heated to 100° C.

The calomel separated as a lustrous purely white precipitate, which when thrown on a tared filter, well washed and dried, weighed 1·8989 gram.

Now by the equation 942 grams of calomel are produced by 66 grams of H_3PO_2, so that calculation proved that ·45328 gram of the sample contained ·133 gram of pure H_3PO_2 which is equal to 29·48 per cent.

The quantitative estimation is tabulated below:—

		Percentage of H_3PO_2	
Sample.	Sp. gr.	NaHO estimation.	Reduction of $HgCl_2$ to HgCl.
A. . .	1·1332	29·12	28·48
B. . .	1·1367	29·95	29·95
C. . .	1·0442	8·87	8·87
D. . .	1·0353	8·07	8.07

If any reliance can be placed on the qualitative estimations submitted to you, it would seem that the acid cannot be prepared free from calcic oxalate if the lime and oxalic acid process is used for its preparation.

As there cannot be any doubt but that freshly precipitated oxalate

of calcium is to a certain extent soluble in hypophosphorous acid, for I verified this by an experiment, the question arises, "Is the presence of calcic oxalate likely to have any deleterious effects?" Supposing the sample to be required for the preparation of a compound syrup of the hypophosphites containing the calcium salt, it would lead to endless trouble to keep a presentable syrup. Even if it were contained as free oxalic acid it would be more easily got rid of (as it would be all thrown out at once) than by the slow process of precipitation which would go on for months, as in presence of a less acid solution the calcic oxalate slowly separated. If it were required for dispensing purposes it would when diluted gradually deposit its impurity. Again the quantity of impurity introduced into the system would amount to something considerable in time, were the medicine persisted in. In short, the acid is not likely to recommend itself as a mode of exhibiting the hypophosphorous radicle until the commercial article is to be obtained purer. I have never personally come across a sample of the commercial drug that did not deposit more or less after being kept for a week or two.

Mr. A. E. Robinson, in a paper read before the British Pharmaceutical Conference, in 1885, suggested the use of this acid as a preservative agent, for a concentrated solution of ferrous iodide, specifying that care must be taken that the acid should contain no oxalic acid. Then these samples, whether used as a preservative for ferrous iodide, bromide or chloride, would not do. It was thought likely that the more concentrated solution would give evidence of the presence of phosphorous acid, but this was not so, except in one case, and the volumetric and gravimetric estimations taken conjointly confirm this. The high specific gravity of sample C is due to excessive quantity of lime salt it contained. That the neutralizing power of the samples is lower than their reducing power is also borne out by the same fact. The only inquiry suggested by the quantitative estimation is, "Whether a 10 or 30 per cent. sample should be used when acid hypophosphorous is simply ordered?" The quantitative determinations proved one thing, however, which would otherwise have remained a matter of doubt, namely, that phosphorous acid was absent almost entirely from the samples.

This was contrary to my preformed judgment, having thought that at all events the more concentrated solutions would contain appreciable quantities. Had there been another week at my disposal before com-

municating these notes, I intended preparing a sample of the acid by the barium salt and sulphuric acid process, and submitting it to you with a recommendation. The process which I intended following was to decompose 29·5 grams of the pure barium salt, dissolved in 120 cc. of distilled water, with 10 grams of H_2SO_4, specific gravity 1·843, filtering, washing to make the filtrate measure about 150 cc., and concentrating until the fluid weighed 65 grams, when it should contain 20 per cent. H_3PO_2. As I am not certain whether the nascent acid may not render some of the barium sulphate soluble by reducing a quantity of that precipitate to sulphite, I cannot offer the process guaranteed.

Regarding the concentration I feel sure that an acid of 20 per cent. would be suitable for every purpose, and this cannot be said of the weaker, while at the same time it would not be rendered liable to the alteration which further condensation would produce.

I have only, in conclusion, to thank the firm of James Robertson and Co., 35 George Street, for placing samples at my disposal, and for allowing the use of their reagents and apparatus to conduct these experiments. I have particularly to thank Mr. A. A. Lumsden, who has most obligingly rendered me invaluable aid in conducting and verifying the quantitative estimations. Besides he has placed at my disposal his counsel and advice on the whole subject, and backed by his assistance as a technical analytical chemist of many years' experience, I am emboldened to submit these notes to your full and free criticism.

Since reading the above Mr. Boa has drawn my attention to the fact that my results confirm to a considerable extent those arrived at by Mr. Branson, whose published remarks I had not previously seen.

IODOFORM AS AN ANTISEPTIC.

By Ch. Heyn, and T. Rosving.

The authors maintain (*Fortsch. d. Med.* January 16, 1887.) that the antiseptic powers of iodoform have been assumed but not proved, and record a series of experiments which have led them to the conclusion that iodoform is not an antiseptic. They affirm that micro-organisms, even when covered with powdered iodoform, grow freely. They inoculated sterilized iodoform jelly with

a series of micro-organisms—pneumococcus, staphylococcus aureus, bacillus subtilis, and a micrococcus from the pus of a rat—and found all growing freely on the third day. Olive oil containing four per cent. of iodoform had no influence on the growth of bacillus subtilis and staphylococcus aureus, either at ordinary temperatures or at blood heat, and both grew after two days in a mixture of equal parts of this oil and calf's serum. In iodoform spray they demonstrated, they think, the presence of numerous micro-organisms; and a plug of iodoform gauze retained in the vagina for two hours, though odorless, was shown by cultivation experiments to contain bacteria.

Heyn and Rosving record a series of experiments on animals, which they assert support their view that iodoform does not possess antiseptic properties. In one case a cultivation of staphylococcus aureus was mixed with iodoform powder, and after ten days injected into the knee joint of a rabbit. Next day the rabbit was evidently ill, and the joint was swollen. On the third day some pus was drawn from the joint, and from this, characteristic pure cultures of staphylococcus aureus were eventually obtained. The Danish observers conclude from their experiments—

(1) That iodoform is valueless in surgery as an antiseptic, even though it may possess other useful properties.

(2) That as iodoform preparations themselves may contain pathogenous micro-organisms, they cannot be used without some danger.

(3) That even though iodoform be pure there is danger in using it, unless care be taken that the apparatus (brushes, sprays, &c.) by which it is applied are free from infective germs, for the iodoform will not kill these. In support of this view they bring forward a case recorded by Lesser, where a brush, with which a soft sore had been painted with iodoform, was applied next day to dust with iodoform a granulating wound, and a soft sore formed on the wound in consequence.

In a recent number of the *Wien. med. Woch.*, the paper of Heyn and Rosving is subjected to criticism which is unnecessarily abusive. The conclusions arrived at as to the uselessness and even danger of iodoform dressing may not be fully warranted by the results of their experiments, but they have done good service by drawing attention to the subject. If their results are confirmed, we must hesitate before accepting some of the clinical inferences which we are apt to draw from experimental work on the destruction of micro-organisms by various agents.—*Med. Chronicle*, March 1887.

ARBUTIN.

Uva Ursi leaves contain, in addition to tannic and gallic acids, a bitter glucoside, arbutin, which is white, crystalline, and soluble in water. During the past four years several observers have tried to determine whether arbutin might not, with advantage, be substituted for the various preparations of uva ursi now in use. Lewin, in 1883, (Virchow's *Archiv*, XCII., p. 517,) showed that arbutin splits up, when boiled with dilute sulphuric acid, into hydrochinon, methyl hydrochinon, and sugar, and stated that when administered it is in part decomposed, so that the urine contains besides arbutin a certain amount of hydrochinon. Now hydrochinon is itself an antiseptic and antipyretic, and has been found useful by Brieger as an injection in gonorrhœa. Lewin recommended the substitution of arbutin, in 15 grain doses, for the ordinary preparations of uva ursi. Uva ursi is a reputed diuretic as well as a specific in vesical catarrh. Menche published a paper in 1883 (*Cent. f. kl. Med.*, XXVII., p. 443,) on arbutin as a diuretic, and recorded some cases which served to illustrate its value in cardiac dropsy. Subsequent observations have not confirmed Menche's views on this point. In a few cases of cardiac dropsy, in which the drug was given at the Manchester Infirmary, it proved wholly inefficacious as a diuretic.

Paschkis (*Wien. med. Presse*, 1884, No. 13) obtained no good results from the use of arbutin in several cases of cystitis and gonorrhœa, though he found these ailments markedly improved by uva ursi itself. Either arbutin is not the active curative principle, at least in the doses employed by Paschkis (30 grains daily,) or the preparation he used was not arbutin.

Schmiz (*Cent. f. kl. Med.* No. 49, 1884) found arbutin very useful in some cases of bladder catarrh. He did not see good results follow its use in all cases, but recommends its use in preference to uva ursi itself. Very recently Kunkel (*Münch. med. Woch.*, December 7th, 1886) published his investigations upon the absorption and excretion of arbutin, and has arrived at the conclusion that the greater part is excreted unchanged; a little is decomposed in the intestine, but it is not decomposed, as Menche thought, in its passage through the system. At the present time then the value of arbutin must be regarded as doubtful, and though it may be tried in doses of 10 grains, where ordinary remedies have failed to relieve bladder catarrh, it cannot be used as a reliable remedy. Moreover its price (about eighteen pence a drachm) prevents its extensive use.—*Med. Chronicle*, March 1887.

NOTE BY THE EDITOR, AM. JOUR. PHAR.—In connection with the above, some older observations deserve to be mentioned. Prof. C. D. Schroff states (Pharmacologie, 1862, p. 142), that arbutin taken in doses of 0·1, 0·2 and 0·5 gm. did not produce any appreciable result; that the urine was not altered, either in amount or color, and that arbutin could not be detected in the urine. Husemann and Hilger (Pflanzenstoffe, 2d edit. p. 1127) report also the results of Jablonowski's experiments, according to which no effect was observed from 20.0 gm. of arbutin taken within 48 hours, and the urine contained neither arbutin nor hydrokinone, but in place thereof benzoic acid and a humin like substance insoluble in alcohol. On the other hand, hydrokinone-sulphonic and methyl-hydrokinone-sulphonic acids were found in the urine by Mering, after arbutin had been taken. In view of these conflicting results is it not likely that the effects of arbutin are materially modified by the presence of other constituents of uva ursi, like ericolin, gallic acid, and the peculiar tannin which is present? The same or closely allied constituents have been shown to exist also in other sempervirent ericaceous leaves, like chimaphila, epigæa, manzanita (Arctostaphylos glauca) &c., which are reputed to possess diuretic properties.

PEPTONES IN THE BLOOD AND URINE.

BY GEORGES.

All the methods hitherto proposed for the detection of peptones in urine are more or less defective. The author gives the preference to the two following:—

I. This has been recently employed by Wassermann for the detection of peptones in the blood. The blood is received in strong alcohol; the clot thrown on a filter is washed first with cold then with boiling water; the aqueous solution is concentrated to about double the volume of the blood taken, and then added to the alcoholic solution; sodium acetate and ferric chloride are now added to the liquid. After filtration a cooling, the last traces of albumin are removed by adding potassium ferrocyanide and acetic acid, filtered, the excess of ferrocyanide precipitated by copper acetate, filtered, excess of copper removed by hydrogen sulphide; filtered again, and heated on the water-bath to expel hydrogen sulphide and to concentrate the liquid. This method gives good results, especially if care be taken to neutral-

ize, or even to add any slight excess of alkali on adding the sodi acetate and ferric chloride. It also serves very well for the investigation of peptones in urine, commencing by boiling to precipitate albumin coagulable by heat, and terminating as above.

II. The double iodide of potassium and mercury precipitates albumin and the peptones, and Tanret has shown that the albuminous precipitate is insoluble in boiling acetic acid, whilst the peptone precipitate dissolves completely. Employing these reactions, Georges has established a much more rapid method as follows:—Precipitate by heat all the coagulable albumin; treat the urine with acetic acid and the double iodide, wash the precipitate on a filter with cold water charged with acetic acid to the same extent as the urine; wash again with the same acidified water boiling, keeping the washings apart. The clear liquid obtained gives a precipitate on cooling if the least trace of peptonic precipitate has been dissolved. It is only necessary to neutralize in order to obtain a solution to which the double iodide test can be applied.—*Jour. Chem. Soc.*, Feb. 1887, 188; *Jour. Phar. Chim.* 1886.

PTOMAÏNES.[1]

By H. Beckurts.

The detection of poisonous alkaloids in forensic and similar cases is greatly increased in difficulty owing to the formation of ptomaïnes from albuminoid substances of animal or vegetable origin, more especially as the ptomaïnes in their general chemical reactions bear great resemblance to the vegetable alkaloids. It has repeatedly occurred in criminal cases, that the two classes of compounds have been confounded, even by experts. All the basic nitrogenous products which result from the action of bacteria, whether of disease or decomposition, must be considered as ptomaïnes; and perhaps also certain definite poisonous basic substances, the leucomaïnes, which according to Gautier are formed during life in man and the higher animals.

Until very recently, only ptomaïnes of unknown composition had been isolated, and in all cases by the methods of Stas-Otto and Dragendorff. It is mainly to Brieger's investigations during the past four years, that we are indebted for a more accurate knowledge of

[1] *Arch. Pharm.*, 1886, 1041–1065. Reprinted from *Jour. Chem. Soc.*, April, 1887.

the composition of these compounds. From decomposing flesh, Brieger obtained *neuridine*, $C_5H_{14}N_3$, and *neurine*, $C_5H_{13}NO$. From decomposing fish he obtained a poisonous isomeride of ethylendiamine, possibly *ethylidenediamine*, $C_2H_4(NH_2)_2$, *muscarine*, $C_5H_{15}NO_3$, and the physiologically inactive *gadinine*, $C_6H_{17}NO_2$. Fully decomposed cheese yielded neuridine. Decomposing glue gave neuridine, dimethylamine, and a muscarine-like base, whilst rotten yeast gave *dimethylamine* only. As these compounds result from the action of bacteria on animal tissues, so Brieger showed that the same or analogous compounds were similarly formed in the human subject. In the earlier stages of decomposition, only *choline* was found. After three days, neuridine appeared in increasing amounts, whilst choline gradually disappeared, being replaced by trimethylamine. After fourteen days, neuridine had also disappeared. Later, there most commonly appeared *cadaverine*, $C_5H_{16}N_2$, and *putrescine*, $C_4H_{12}N_2$. With cadaverine is also found a substance of the same composition, called *saprine*, but differing considerably in its reactions. The bases choline, neuridine, cadaverine, putrescine and saprine are physiologically indifferent; but after fourteen days' decomposition a new poisonous base, *mydaleine*, was obtained which seems to be a diamine. In human remains (heart, lung, liver, etc.), maintained at -9 to $+5°$ C. during four months, a new base, *mydine*, $C_8H_{11}NO$, was found, a strongly reducing agent, and a poisonous base, *mydatoxine*, $C_6H_{13}NO_2$, also the poisonous *methyl-guanidine* was isolated. O. Bocklisch, employing Brieger's method, obtained a large number of bases from decomposing fish. The bases so obtained were not poisonous, and attempts to separate the injurious compounds were unsuccessful. The fact that decomposition bacteria induce the formation of numerous basic substances from albuminoid compounds, makes it highly probable that pathogenic bacteria possess similar properties. Thus, Koch, Nicati and Rietsch have found poisonous ptomaïnes in cholera. In cultivation of typhus bacilla, a strongly basic poison, *typhotoxine*, $C_7H_{17}NO_2$, was obtained; and from tetanus cultivations a strong base, *tetanine*, $C_{13}H_{30}N_2O_4$, was obtained. The bases obtained by Brieger are either liquids of definite boiling point, or solid crystalline substances. The salts show the so-called general alkaloid reactions, so that as a group the ptomaïnes cannot be separated from the alkaloids. The non-poisonous ptomaïnes readily give rise to poisonous compounds; thus, cadaverine, which has been shown by Ladenburg to be *pentamethylenediamine*, is con-

verted by rapid distillation of the hydrochloride into the poisonous *piperidine*. Whilst the constitution of cadaverine has just been indicated, putrescine is either a dimethylethylendiamine or methyl-ethyl-methylendiamine; which of the two, further investigation must decide. The present methods of isolating the alkaloids do not yield absolutely certain results, and further extended investigation is required.

Supplementary to the above are the researches of C. Gram (*Chem. Centr.*, 1886, p. 647), who obtained from putrid meat in various conditions of putrefaction by treatment with amylalcohol, bases, which, like their hydrochloric acid derivatives, were perfectly inert, while decidedly poisonous properties were observed in the lactic acid compounds under similar treatment. Similar observations were also made with bases obtained from putrid yeast free from the poisonous *sepsine*. Choline, which is widely distributed throughout animal and vegetable organisms, gives rise to a poisonous substance with muscarine-like action, if heated, in combination with lactic acid.

INOSITE.[1]

By Maquenne.

Walnut leaves are extracted methodically with about four times their weight of water, and the boiling solution is precipitated first with milk of lime, then with lead acetate, and finally with basic lead acetate, which forms an insoluble compound with the inosite. The last precipitate is washed with water, decomposed by hydrogen sulphide, and the solution concentrated to a syrup. The boiling liquid is then mixed with 7 or 8 per cent. of concentrated nitric acid, which destroys nearly all the foreign matter without attacking the inosite, and, after cooling, a mixture of 4–5 vols. of alcohol with 1 vol. of ether is gradually added to the nearly colorless liquid. Inosite is thus separated as a colorless flocculent precipitate, which is recrystallized from dilute acetic acid, dissolved in water, again treated with nitric acid, and again precipitated with alcohol and ether. A small quantity of calcium sulphate, which always occurs in the product, is decomposed by adding barium hydroxide, and the barium is removed by means of ammonium carbonate, the product being finally recrystallized from water. The yield is about 2·94 grains per kilo. of leaves.

[1] *Compt. rend.*, 104, p. 225–227. Reprinted from *Jour. Chem. Soc.*, April, 1887.

Anhydrous inosite has the composition $C_6H_{12}O_6$, whilst the crystals have the composition $C_6H_{12}O_6 + 2H_2O$; they lose all their water at 110°. Inosite does not volatilize without decomposition, but its molecular weight can be determined by Raoult's cryoscopic method, that is, by determining the freezing point of its aqueous solution. The freezing point of a solution of 2·5 grams of inosite in 100 grams of water is —0·29°, whilst the calculated value for $C_6H_i O_6$ is—0·27°.

Inosite is only slightly soluble in cold, but very soluble in warm water. It is insoluble in alcohol, ether and glacial acetic acid, but dissolves readily in dilute acetic acid, from which it can be easily crystallized. It melts at 217° without carbonization, and boils with slight decomposition in a vacuum at 319°. When heated in the air it burns readily. Solutions of inosite are optically inactive, both when freshly prepared and after they have been in contact with *Penicillium glaucum* for six weeks. Inosite is not attacked by boiling dilute acids or alkalis, does not reduce copper solutions, and is not acted on by ammoniacal silver nitrate alone, but in presence of sodium hydroxide it yields a mirror of metallic silver. It does not combine with sodium hydrogen sulphite, is not reduced by sodium amalgam, and is not sensibly affected by halogens in the cold. When heated with bromine and water at 100°, it yields brown products precipitable by salts of barium and similar to those obtained in Scherer's reaction. These compounds contain no bromine, and are oxidation-products which can be more readily prepared by the action of nitric acid.

No acid containing six carbon-atoms can be obtained from inosite, nor will it split up into oxy-acids of the acetic series. It is neither an aldehyde nor a ketone, and contains neither double bonds nor lateral chains; hence, it can only be a hexhydric hexa-secondary alcohol, with a constitution represented by the symbol—

$$OH{\cdot}CH\begin{matrix}<\\>\end{matrix}\begin{matrix}CH(OH){\cdot}CH(OH)\\CH(OH){\cdot}CH(OH)\end{matrix}\begin{matrix}>\\<\end{matrix}CH.OH,$$

which agrees with its optical inactivity.

ACTION OF SALIVA ON STARCH.[1]

By E. Bourquelot.

Potato starch, free from glucose, was heated with water to a definite temperature, cooled down to the ordinary temperature, and then mixed

[1] *Compt. rend.*, 104, pp. 71–74 and pp. 177–180. Reprinted from *Jour. Chem. Soc.*, April, 1887.

with saliva. When fermentation was complete, the reducing power of the liquid was determined by means of Fehling's solution. The saliva acts only on the starch which has undergone hydration, and it was found that the hydrating action of water begins at about 52°, and increases somewhat irregularly up to 74°, beyond which point an increased temperature exerts no sensible effect.

In a second series of experiments, the water and saliva were mixed together, heated up to a definite temperature, the starch added, the temperature maintained for about 3½ hours, and the reducing power of the liquid was then determined. The results show that saliva acts on starch at a temperature below that which water alone exerts any hydrating action. Feebly acid or alkaline liquids, or solutions of sodium chloride or phosphate have no action on amylose at temperatures below 53°, and saliva in which the ferment has been destroyed by boiling is scarcely more active. It follows that it is the diastase in the saliva which assists the hydrating action of the water.

At the temperature at which water alone begins to convert starch into a hydrate saccharifiable by saliva at the ordinary temperature, water mixed with saliva has a more energetic action than when water and saliva are allowed to act successively in the way described. The difference diminishes, however, as the temperature approaches 58°, at which point the two actions are equal. At higher temperatures the action is greater if the water alone is heated, and the saliva is afterwards added to the cooled liquid, than when the saliva and water are heated together, since the high temperature destroys the diastase in the saliva.

Potato starch was heated with saliva and water at different temperatures for different periods of time. At temperatures below 57°, the amount of reduction increases with the temperature and also with the time, but is not proportional to the latter. At temperatures above 57°, however, the action continues to increase with the temperature, but attains its maximum in about five hours, and proceeds very little further even if the experiment is prolonged to thirty hours.

The hydrating action of water alone increases with the temperature, and is practically complete after five hours, increasing but little if the experiment is continued for thirty hours. The hydrating action of the water is independent of the mass of the water.

It is a general rule that a reaction effected on a single carbon compound is proportional to, or in direct relation to, the time, especially if the action is of the nature of hydration. The divergence from this rule observed in the case of starch and water indicates that starch granules are composed of a complex mixture of carbohydrates, and not only of one or two compounds (glanulose and amylose). Possibly these different compounds are polymerides of one original substance. This view is similar to that held by many physiologists concerning the different layers of cellulose which constitute cell-walls.

BAHAMA SPONGES.

By E. M. Holmes, F. L. S.,

Curator of the Museum of the Pharmaceutical Society.

In the Bahama Court of the late Colonial and Indian Exhibition a fine series of the different commercial varieties of West India sponges was exhibited, and since its close a typical specimen of each of them has been presented to the Museum of the Pharmaceutical Society. During the last few years sponges have formed an article of considerable import from the Bahamas to this country, and a description of the different kinds met with in commerce may therefore be found useful for reference. In order to make clear the features in which the several commercial varieties differ, it will be necessary to refer briefly to the structure of these animals in a living state.

By zoologists sponges are classed as an order of the sub-kingdom Protozoa, the leading feature of which is that the animals included in the order consist of a composite mass or colony of small amœboid particles of gelatinous matter, supported by a skeleton, which consists either of a network of horny fibres or of calcareous or silicious spicules.†

Consequently in the fresh state sponges present an appearance exceedingly different to that with which we are familiar, forming dark, unsightly masses of jelly, and it is only when the sarcode or gelatinous matter is removed that the skeleton, known as the sponge of commerce, becomes visible. In the living animal the surface presents a large number of minute orifices or "pores," and a few much larger ones, known as "oscules," or excurrent apertures. Both of

† Of the last-named, the pretty "Venus flower-basket" (*Euplectella Aspergillum*) and the glass rope sponge (*Hyalonema mirabile*) are instances.

these can be closed at the will of the animal. A current of water carrying food to the animal enters through the smaller openings, and is subsequently ejected through the larger openings or oscules. This current is set up by means of specially ciliated sponge particles contained in cavities below the surface of the sponge, the cilia waving in one direction only, like those of the mucous membrane of the lungs in higher animals; the ordinary particles of the sponge flesh possessing no cilia, but having only an amœboid movement. The openings in the gelatinous surface correspond to the openings visible in the horny skeleton, and it is by the character and the arrangement of these, as well as by that of the fibres, that sponges are classified both commercially and scientifically.

Until the discovery of sponges in the Bahamas and in the vicinity of Florida, all the sponges of commerce were derived from the eastern half of the Mediterranean sea, which still supplies the finest qualities. A great number of varieties, both in form and relative degrees of softness or hardness, are recognized; one London sponge merchant even asserting that there are as many as four hundred Mediterranean kinds. These varieties, whether of European or American origin, are referred by zoologists to three principal types:—

1. *Spongia officinalis*, L., which is the source of the Turkey cup sponge.

2. *Spongia agaricina*, Schmidt, affording a cup sponge of harder and more unyielding texture than the Turkey cup and known as the Zimocca sponge.

3. *Spongia equina*, Schmidt, yielding the bath or honeycomb sponge.

The first, according to Mr. Saville Kent,* is distinguished by its usually cup-shaped contour, by the exceedingly fine elastic and densely interwoven fibres of which it is composed, and by the oscules being more crowded towards the centre of the cup.

The second, or Zimocca sponge, is recognized at sight from the Turkey cup sponge—which it closely resembles in shape, although the cups are flatter and more saucer-shaped—by the fact that the larger openings, instead of being crowded towards the centre of the cup, are uniformly scattered at nearly regular distances over its whole upper surface, and by being much harder and more unyielding to the

* "Report on the Sponges of the Bahama Islands," by W. Saville Kent, p. 407, in 'Fisheries Exhibition Literature,' vol. v., part ii.

touch. The fibres are closely interwoven, as in the Turkey kind, but are coarser and less elastic. It is only one-third the value of Turkey sponge.

The third, or honeycomb sponge, has a more spheroidal or rounded form, flattened above, and the larger or excurrent openings are irregularly scattered over the upper surface. In this kind the erect or primary fibres are not visible.

The Bahama sponges correspond closely with the typical forms above described in general characters, and by Mr. A. Hyatt,† the American spongologist, are considered to be varieties of these species. He expresses the opinion, however, that the coarser varieties of the European sponges are finer, firmer, and more elastic than the finest of the corresponding American sub-species, the inferiority of the latter being attributed to the large amount of foreign matter included in their primary fibres, the looser mesh of the fibres, which are comparatively coarse, and the larger and more numerous canals.

The Bahama sponges are referable, according to Mr. Hyatt, to the following sub-species:—

Reef, or glove sponge, to *Spongia officinalis*, var. *tubulifera*.

Sheeps' wool sponge, to *Spongia equina*, var. *gossypina*.

Abaco velvet and cay velvet sponge, to *Spongia equina*, var. *meandriniformis*.

Grass sponge, to *Spongia equina*, var. *cerebriformis*, and *Spongia graminea*.

Hardhead sponge, to *Spongia agaricina*, var. *typica*.

Yellow sponge, to *Spongia agaricina*, vars. *corlosia*, *dura* and *punctata*.

Reef, or Glove Sponge.—Although resembling Turkey sponge in the closeness of its mesh it is quite different in shape, being broadest at the base and convex or dome-shaped above, and sometimes compressed laterally. The oscules are fewer in number, rather large, and are often situated in a row opening on the top of the sponge. The texture becomes very brittle with age and is never so elastic as the Turkey sponge; being very soft and much cheaper than the latter (only about one-tenth its value), it answers very well for surgical purposes where it is necessary to renew the sponges frequently.

The glove sponges, as a rule, are of comparatively small size. They grow gregariously on a hard bottom or on reefs, five or six feet below

† 'Revision of the North American Poriferæ,' Boston Soc. Nat. Hist., 1876.

the surface of the water, and sometimes are irregular or dendritic in shape, and are then much less valuable. Those known as reef sponges are similar in shape to the glove sponge, but are rather harder, and have the oscules more regularly distributed over the surface. Old specimens become very brittle and are easily torn. A third kind, scarcely distinguishable from the glove sponge by the eye, but harder even than the reef sponge to the touch, is described as a "hardhead" sponge.

Sheeps' Wool.—This variety corresponds most nearly with the honeycomb sponge of the Mediterranean, and is, indeed, an American variety of that sponge. It derives its name from the fact that the fibres of the external surface are developed in the form of little pointed tufts, which give the sponge a peculiar fleecy appearance. In its sub-spheroidal shape it resembles the Mediterranean honeycomb sponge; the larger apertures are distributed with comparative regularity over the upper surface, the fleecy tufts sometimes projecting and converging over the openings; the inner substance is honeycombed with tortuous channels. This sponge is soft to the touch and is suitable for bath and toilet use, but is only one-half the price of the Mediterranean honeycomb sponge. It is found at depths varying from three to sixteen feet or more, the finest in size and fibre being found at the greatest depth. A sponge very similar in appearance to the sheeps' wool, but much harder to the touch, is met with, which is classed as a "hardhead" sponge.

Abaco Velvet or *Boat Sponge.*—This sponge bears a general resemblance to the sheeps' wool in shape and size, but the superficial tufts of fibres stand out more distinctly and are more obtuse and somewhat broader. The most marked feature consists in the oscules being crowded in the centre of the sponge and there uniting to form one or more rarely two, large openings which much depreciate its value. If the opening is closed by passing a thread round it and then drawing the sides of the aperture together the sponge will last much longer. In texture it is as soft as the sheeps' wool; it is quite suitable for toilet use, where a cheap sponge is required, and is about 25 per cent. cheaper than the sheeps' wool.

Cay Velvet.—This sponge is a harder variety of the Abaco velvet, being much more resistant to the touch. It presents in a still more marked manner than that sponge the peculiar appearance like brain coral (*Meandrina*) which characterizes the velvet sponges. It is chiefly used by painters and for stables and domestic cleaning purposes.

Grass Sponge.—This is a soft sponge, rounded or oblong in outline, with the oscules crowded together on the upper surface, each oscule being generally surmounted by a short thin projecting tube of sponge fibre, which has a longitudinally striated appearance, quite characteristic of this sponge. Occasionally there are a few large openings at the side. Another very noticeable feature in this variety is that the projecting tufts of fibres are very slender and appear to be arranged in a somewhat regular manner in perpendicular lines, which, extending to the upper surface, gives it a singularly radiate appearance. Although very soft and elastic, the grass sponge is easily torn, owing to the looseness of its fibre. It is quite soft enough for toilet use, and is only about one-third the price of the sheeps' wool sponge.

Another form of the grass sponge is described by Mr. Hyatt under the name of *Spongia graminea*, and included by him under the grass sponges; it has a coarser texture and the internal tissue is very open, owing to the large size and central position of the larger openings. It usually has the shape of a truncated cone, and is fluted on the side with deep furrows, the truncated apex being either flat or funnel-shaped and the oscules appearing on the truncated apex. It is a gregarious form, growing only three feet below the surface of the water.

Hardhead.—The sponges that pass under this name do not form a distinct kind, but the term is applied to hard varieties of the above sponges; thus there is a hard-head glove and a hardhead sheeps' wool. The former appears to bear the same relation to the glove or reef sponge that the Zimocca does to the Turkey cup sponge.

Yellow.—This sponge is the coarsest and hardest of all the Bahama sponges. It presents a dome-like shape and exhibits on the upper surface a few, often slightly projecting oscules, which are large enough to admit the little finger. The superficial tufts of fibre have a branched appearance with finely fringed ends. To the touch the sponge is quite tough and hard, yielding only to considerable pressure, and its texture is brittle. It is fit for stable use or where a coarse sponge only is required, and is only about one-tenth the price of honeycomb sponge.—*Phar. Jour. and Trans.*, March 19, 1887. p. 761.

GLEANINGS IN MATERIA MEDICA.

By the Editor.

Asparagin is lævorotatory and its crystals have left-handed hemihedral faces. A. Piutti (*Compt. Rend.*, vol. 103, p. 134) has obtained from the mother-liquor of crude asparagin an isomeride with right-handed crystals and dextrorotatory power, and of a much sweeter taste. The derivatives of the two varieties of asparagin are chemically identical, but differ optically, and the two aspartic acids combine in equal proportions to asparagenic acid, which is inactive and gives monoclinic crystals.

Smilax glycyphylla.—Prof. E. H. Rennie, of Adelaide, South Australia, has further examined the *glycyphyllin* described in 1881 (Am. Jour. Phar., 1881, 237). The ethereal extract of the alcoholic extract of the leaves was repeatedly crystallized from hot water containing a very small quantity of water, and the last traces of coloring matter were removed by quickly shaking up the warm aqueous solution, cooled down to beginning crystallization, with ether and filtering the ethereal solution, or by precipitating the coloring matter from the hot aqueous solution by lead acetate, treating the filtrate with H_2S and again filtering. The principle has the composition $C_{21}H_{24}O_{29}$ and crystallizes from water with $4\frac{1}{2}$ aq., and from aqueous ether with 3 aq. It is insoluble in chloroform, benzene and petroleum benzin, somewhat soluble in ether, freely soluble in hot water, and very sparingly soluble in cold water, but imparting to it its peculiar liquorice-like taste. The solution is precipitated by basic lead acetate, but not by the normal acetate. The solution in alkali becomes red brown on exposure. On boiling with dilute sulphuric acid the principle is decomposed into *isodulcit* $C_6H_{14}O_6$ (melting point 93–94° C.), and *phloretin* $C_{15}H_{14}O_5$ (melting point 250° C.); the latter, on being boiled with potassa, yielded phloroglucol $C_6H_6O_3$ (melting at 208°), and phloretic acid $C_9H_{10}O_3$ (melting at 127°). The theoretical yield, according to the above formulas, is phloretin 65·22 and isodulcite 43·33 per cent.; by experiment, 65·01 to 66·31 per cent. of the former and 42·2 per cent. of the latter were obtained. —*Jour. Chem. Soc.*, Dec., 1886, p. 857.

Euphorbia Drummondi, Boissier, a native of West Australia, is stated to possess valuable anæsthetic properties, and to contain an alkaloid which Dr. John Reid, of Port Germain, South Australia,

called *drumine* (*Austral. Med. Gaz.*, Oct, 1886). A tincture is prepared of the plant or milk juice with alcohol containing hydrochloric acid, then concentrated by distillation, precipitated by ammonia, and filtered; the residue is dissolved in dilute hydrochloric acid, decolorized by animal charcoal and evaporated when boat-shaped colorless crystals are obtained. The alkaloid is stated to be almost insoluble in ether, but freely soluble in chloroform; also in water. A 4 per cent. solution of the alkaloid dropped into the eye produced local insensibility without appreciably dilating the pupil. A subcutaneous injection of 3 grains showed no effect in a cat beyond local anæsthesia; but a larger dose by the mouth caused paralysis of the limbs and difficult breathing, and strychnine failed to produce muscular contraction. Applied to the tongue or nostrils, loss of taste was observed, but small doses swallowed were not followed by any perceptible constitutional symptoms. Dr. Reid recommends the alkaloid more particularly in small operations, sprains and local irritation.

More recent experiments made by Dr. A. Ogston (*Brit. Med. Jour. Feb. 26th.* 1887.) demonstrate that drumine has little if any effect as an anæsthetic. Instilled into the conjunctiva it produced no anæsthesia and had no perceptible effect on the pupil. Used hypodermically on four persons in doses of 4 and 6 minims of a 4 per cent. solution, a sharp and aching pain, followed by swelling and tenderness of the spot was produced, but no anæsthesia. The material employed has been received directly from Dr. Reid.

Euphorbia helioscopia, Lin.—A case of severe ulceration is reported by Dr. Baudry (*Bull. méd. du Nord,*) resulting from the application of a poultice of the bruised plant. The milk juice is stated to be employed by peasants as a cure for warts.

This annual, which belongs to the group of *Tithymalus*, is indigenous to Europe and naturalized in some parts of the United States, in fields and waste places, and is characterized by its terminal umbel-like infloresence, its obovate, finely serrate and more or less wedge-shaped leaves, and its smooth, almost three-lobed fruit containing coarsely reticulated, brownish seeds. With some botanically allied species it was formerly employed as a hydragogue cathartic and is regarded as being less acrid than many other species of the same genus.

Euphorbia Peplis, Lin., is said to be used as a domestic remedy in

hydrophobia, and has been used successfully by Dr. Afonsky (*Russk. Meditz.*, 1886), as a preventive, the drug being given in the form of powder after cauterizing the wound with hydrochloric acid, and using also pilocarpine hypodermically.

This species is likewise an annual, has thickish, obliquely oval entire leaves, axillary flowers and smooth fruits with smooth seeds, and grows in southern Europe. It is used as a cathartic like *Euph. Peplus, Lin.*, which is also an annual, but has roundish, entire and somewhat petiolate leaves, a corymbose inflorescence, the capsule-lobes two-keeled on the back, and grayish pitted seeds; the latter species has established itself in some parts of the United States.

Factitious pepper has made its appearance in the Austrian market, and is manufactured in Budapest. N. Wender describes it (*Zeitsch. Oest. Apoth. Ver.*, 1887, p. 147) as resembling a ribbed pill, and states that it is sold at about two-fifths of the wholesale price of Singapore pepper, and that it has been used for adulterating unground pepper to the extent of 75 per cent. Examined by Dr. Hanausek, this artificial product was found to be manufactured of wheat flower, most likely mixed with alcoholic extract of pepper (the oleo-resinous by-products left in preparing piperine? *Editor*), and colored with a black pigment, lampblack; it was free from capsicum.

Olea fragrans, Thunberg, and *Forsythia suspensa, Vahl*, two Japanese oleaceæ, according to J. F. Eykman, contain a new glucoside, $C_{26}H_{32}O_{11}$, which crystallizes in colorless silky needles, is insoluble in ether and petroleum, and sparingly soluble in cold water, from which solution it is not precipitated by lead and other mineral salts. By oxidation with chromic acid it yields a compound having the odor of vanillin, and by boiling with acids it is decomposed into glucose and a substance of phenolic properties, the latter being readily soluble in alcohol and ether, sparingly soluble in water and insoluble in petroleum benzin.—*Jour. Chem. Soc.*, 1886, p. 1040.

In its physical properties the new glucoside resembles *phillyrin*, $C_{27}H_{34}O_{11}$, the composition and properties of which were investigated by Bertagnini in 1860, but which had been used by Carboncini since 1825 as a febrifuge. The latter had at first regarded it as an alkaloid; in 1836 he published the process by which he obtained it from the bark of the South-European species of Phillyrea. This process consists essentially in preparing a decoction, adding lime, exhausting the sediment with alcohol, decolorizing and crystallizing.

Rubus Chamæmorus, Lin., known as *cloudberry*, is indigenous to Canada and the White Mountains, to Northern Asia and Northern Europe. The amber-colored fruit is of a pleasant acidulous taste. The pubescent and wrinkled leaves are about 1½ inch long and 2 inches broad, reniform in shape, roundish five-lobed and crenately dentate, have an unpleasant sweet, afterwards bitter taste, and are popularly used in Siberia in various urinary complaints. Recently (*Russk. Med.*, 1886) the leaves have been recommended by Dr. Ivan Troitzky, of Smolensk, as an excellent diuretic in dropsies, in the form of infusion prepared from a drachm of the bruised leaves by digestion with a cupful of boiling water; this quantity is taken morning and evening for about a month; the taste is stated to be not very unpleasant, and the patient to become habituated to this tea.

Cassia alata, Lin.—The leaves are recommended by Conillebault (Thèse, Paris, 1886) for giving prompt relief in ringworm; they are moistened with water and the affected parts are then rubbed: or, an acetic extract of the leaves may be used.

In India the plant is regarded as a cure for poisonous bites and for venereal eruptions, and the leaves have long been used for curing ringworm. Lindley describes the leaves as being 2 feet long, abruptly pinnate. Leaflets opposite, from 8 to 14 pairs, the exterior largest, linear-oblong, obtuse or emarginate, with a point, smooth, entire, veined; 3 to 6 inches long, 2 to 2½ inches broad; the lower pair somewhat distant, nearly round and reflexed back on the stem or branches. Petioles channelled, the channel large and formed by two thin firm yellow borders. There is a cross-bar between each pair of leaflets, covered with small dark-colored bristles, and there is no other gland. Stipules auriculate, rigid, pointed, persistent, appearing like prickles.

The plant is shrubby like Cassia Sophora, *Lin.*, the leaves of which are similarly employed. Cassia Tora, *Lin.*, an annual of Southern Asia, is reputed to have similar antiherpetic properties; likewise Cassia occidentallis, *Lin.*, which is common throughout the tropics, has been naturalized in the Southern United States as far north as Virginia, and is known in some localities as *styptic weed.*

Physostigma.—In a paper read before the Chemists' Assistants Association, P. Macewan stated (*Phar. Jour. and Trans.*, Feb. 5, 1887, p. 641), that the cylindric seed noticed by Mr. Holmes among commercial calabar bean in 1879, does not appear to have occurred in the

market since that time. The commercial drug varies in color between violet-black and coffee-brown, the former being the fully ripe seeds, and the latter probably immature. For assaying the seed it is best ground in a mill. The two varieties were found to contain 7·2 per cent. of moisture; the black yielded 3·1, and the brown seed 3·4 per cent. of ash. Petroleum ether extracted from the brown 0·2, and from the black 1·068 per cent. of a golden yellow thick oil, containing crystals of physosterin. Ether now extracted 0 36 per cent. of a yellow oil of agreeable odor, and containing a granular substance apparently different from physosterin. For estimating the alkaloid, the volumetric process, with Mayer's solution, failed to give reliable results, but the gravimetric method was more satisfactory. The author recommends the following process: exhaust the powdered bean, by digestion and percolation, with a mixture of alcohol 3 parts and water 1 part, evaporate the spirit, precipitate with lead acetate, remove excess of lead from the filtrate, render alkaline by ammonium carbonate, and dissolve the alkaloid with chloroform. The alkaloidal residue should be of a pale amber color, and wholly soluble in dilute acid. Thus obtained the alkaloid was found to be soluble in ether, and its iodohydrargyrate to be quite soluble in alcohol; for these reasons the author is inclined to doubt the existence, in calabar bean, of calabarine, announced by Harnack and Witkowski.

Astringent qualities of Heuchera and Mitella.—F. W. Anderson reports (*Botan. Gaz.*, 1887, p. 65,) that the roots of Heuchera hispida, *Pursh*, H. cylindrica, *Douglas*, and H. parvifolia, *Nuttall*, are much used in the west by hunters, prospectors and others as astringents, particularly in cases of troublesome diarrhœa caused by the drinking of water in alkali regions. H. parvifolia is the commonest species in Northern Montana. Of milder and somewhat slower action is the root of Mitella pentandra, *Hooker*, which contains also a bitter principle, and is not likely to cause sudden constipation like the heucheras.

Vitis vinifera, Lin.—A. Hilger and L. Gross have examined (*Landw. Vers. Stat.*, 1886, 170–196,) the organic constituents of different parts of the grape vine. The sap exuding from cut vines contains sugar, inosit, a mucilaginous body, succinic acid, tartrates and citrates. The young shoots and leaves contain potassium bitartrate, calcium tartrate, tartaric and malic acids, quercetin, tannin, starch, gum, glucose, saccharose, inosit, oxalic and glycolic acids, an ether-soluble substance, ammonium salts, and calcium sulphate and phosphate; in au-

tumn malic acid and inosit are absent. The tendrils contain besides much pectin compound, sugar, potassium bitartrate and calcium oxalate. The fruit contains tartaric and malic acid, free and combined with potassium and calcium, tannic, succinic, glyoxylic and glycolic acids, inosit, dextrose, levulose, albuminoids, and traces of quercitrin and quercetin.

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, APRIL 19, 1887.

On motion of the registrar Mr. W. J. Jenks was called to the chair. The minutes of the last meeting were read and no corrections being required they were approved.

The actuary presented on behalf of James T. Shinn the report of the Sixth International Pharmaceutical Congress, held in Brussels, from 31st August, to 6th of September, 1885; and a specimen of Oil of Camphor from Joseph W. England.

The registrar read a paper upon the preparation of *Fluid Extract of Wild Cherry Bark*, by Cyrus M. Boger, Ph. G., which was on motion referred to the committee on publication.

The registrar also read a paper upon *Emulsionizing Chloroform and Ether* by means of gum arabic, which was also referred to the same committee. One of the members present said he had made, while employed with Prof. Parrish, emulsions in almost the same manner and with very satisfactory results. See page 189, vol. for 1872, AMERICAN JOURNAL OF PHARMACY.

Mr. Procter inquired whether any one present had any experience in making a *mixture of Horsford's Acid Phosphates*, pyrophosphate of iron and strychnine, syrup and water. When made the mixture contained a granular precipitate; the customer stated that as dispensed in New York it was of a light greenish color and clear; this it was thought could only be accomplished by filtration which would deprive the solution of much of its value.

Prof. Maisch presented to the cabinet a specimen of *Chinese rouge*, consisting of paper covered on one side with *carthamin*, this layer being of a green color and strong metallic lustre. The coloring matter answers to all the tests for carthamin. The specimen was given to him by our fellow member, Charles A. Heinitsh, who stated that over 50 years ago it used to be sold in his father's store. Mr. Thompson stated that it was replaced by what was called *pink saucers* which some years later were largely sold for dyeing small fabrics and delicate articles; the coloring matter in these saucers frequently showed the same metallic lustre, and was claimed to be carthamin. The chairman said he remembered the Chinese rouge quite well when he was first an apprentice.

Professor Maisch reminded the meeting that at a former meeting he had exhibited specimens of *Strophanthus*, (see March Number p. 158), the seeds of which possess properties similar to digitalis. These seeds were again shown

and attention was drawn to the awnlike appendage of the apex of the seed, this appendage being naked for nearly two inches, and above this portion, for an inch or more, of a delicate feather-like appearance from the long white hairs attached to it. This species is known to come from the interior of Africa, while Strophanthus hispidus from the river Niger, in Western Africa, has seeds with a shorter awn and brownish hairs, and has not been employed medicinally of late years. A copy of a recent number of the "Garten Zeitung" was shown containing an illustration of a new species of Strophanthus, discovered near the Kongo River and which is now being cultivated in the botanical garden at Breslau. The seeds are provided with an awn which is feathery from base to apex; they are poisonous, but it has not been determined whether the poisonous principle is identical with the strophanthin contained in the seeds from the eastern section of Africa. The flowers of the Kongo plant are much larger than those of Str. hispidus, and the bands into which the corolla lobes are prolonged, are much longer.

Mr. Procter asked whether any of the members had had any experience with the *torsion balance*. (See February Number p. 107.) He had lately been using one on trial which while it would carry eight ounces on each pan was still sensitive to a milligramme and even rough usage did not seem to injure it; the results of his experiments so far were quite satisfying and really surprising.

There being no further business, on motion the meeting adjourned.

T. S. WIEGAND, *Registrar*.

EDITORIAL DEPARTMENT.

New buildings for Colleges of Pharmacy.—We are much pleased to make record of the completion of two new buildings specially erected for the accomodation of Colleges of Pharmacy, one in Boston and one in Baltimore.

Of these two institutions, the Maryland College of Pharmacy has a legal existence of 46 years, having obtained its charter in 1841. The course of lectures instituted in the same year was continued until 1847, and after a repose of ten years, the school was reopened in 1857 and maintained an upward course ever since. In 1876, the College secured its own home by the purchase from the city of a building on Aisquith near Fayette street, which had been used for a grammar school. The erection on this site of a new building was commenced last year, and it is now ready in all its parts for use for the designed purpose. The main building is three stories in height, the staircase being on the north side and beyond this the janitor's dwelling. Each floor of the building covers a space of 45x85 feet. On the first floor is the library and trustees' room, the museum, and a large lecture room 43x63 feet with a seating capacity of 412, and occupied by the Professor of Materia

Medica. The second floor is occupied by the Professor of Pharmacy, and contains a lecture room with 200 seats, the professor's private room, a laboratory for pharmaceutical purposes accomodating about 100 students, and adjoining this room a private laboratory. The third floor, containing the Department of Chemistry, is divided in the same manner, and furnishes facilities for lectures and laboratory work, including the balance room.

The Massachusetts College of Pharmacy was organized in January 1823, but it did not obtain a charter until 1852. Lectures on chemistry were delivered at irregular intervals, mainly for the benefit of the members of the College; but a determined effort for the systematic instruction of young employees was first successfully carried out in 1867, and has been continued ever since, improvements being provided for, as called for by experience and by the general progress of science. Nearly two years ago a lot of ground was secured on the corner of St. Botolph and Garrison streets in close proximity to the intersection of the Providence and Albany railroads. The building erected on this lot will be dedicated to its uses on the 4th of May. The basement story contains, besides the boiler room, janitor's quarters and lavatory, the pharmaceutical laboratory. The first floor is occupied by the library, trustees' room, reading room, and the lecture room for the Professor of Pharmacy. The lecture room on the second floor will be occupied by the Professors of Materia Medica and Chemistry, and a large room has been set apart for instruction in microscopy and urine analysis. The entire third floor has been fitted up for the department of analytical chemistry, with suitable rooms for balances, stock, &c. Rooms for the private use of each professor have been provided on each floor.

With such increased facilities for thorough instruction, secured through the devotion and liberality of their members, both institutions deserve the sincere congratulations of all interested in pharmacy, and their best wishes for continued and increased prosperity.

The Botanic Garden at Liége lost its valuable herbarium in the early part of April; a fire broke out in the museum, and although it was extinguished in about half an hour the collection was destroyed in spite of the efforts of the professors and students to save it. The origin of the fire has not been ascertained.

Ground Pumpkin Seed was the subject matter in an action for damages before the Court of Common Pleas in Philadelphia during the past month. By the testimony it appeared that a piece of paper, merely with the words "emulsion of pumpkin seeds" written on it, was presented by the plaintiff, a lady, at the counter of a drug store. The preparation, she was told, would cost 40 cents, and on her objecting to the price she was informed that she could have the ground seeds, which she could take mixed with sugar and milk. She bought the ground seeds, and was furnished with 8 ounces at 15 cents, and with the instruction to take one-half the quantity mixed with a pint of milk, and in case this had not the desired effect, to take the other half a few days afterwards. She took the whole quantity stirred in a pint

of milk, and after some hours was taken with severe pains, which she endeavored to relieve by taking several doses of castor oil and oil of turpentine; but failing in this a physician was called in, who, after a digital examination, found the bowels impacted, and when this was relieved a considerable quantity of the fragments of the tissues of pumpkin seed was seen among the fecal matter. She was attended by this physician about a week, and some time afterwards another physician was consulted, who found her still suffering from the after effects of the impaction. She subsequently called on the druggist and demanded money ($10), and on being refused threatened to sue for damages, publish the case in the newspapers and ruin the business of the druggist.

These are, substantially, the facts elicited during the trial. The memorandum on the paper was stated to have been written by a physician, who, on account of sickness, was not present at the trial. The paper had contained neither signature or directions or the name of the patient, and had not been preserved. The aim of the prosecution seemed to be to have this paper regarded as a prescription, and that in not furnishing the article called for the clerk had prescribed for a patient without being a physician. These attempts failed. In regard to the character of the powder, it was contended that it should not have been like saw-dust, but should have been ground to an impalpable powder, and that this could be accomplished by thoroughly drying the seeds. It was, however, admitted that the seeds were entirely harmless, and could be eaten in large quantity without injury; also that the integuments of corn were of a similar nature and indigestible, like the integuments of pumpkin seeds. It was further shown that pumpkin seeds were sold unbroken, ground and in the form of emulsion; that of late years the seeds ground with the integuments were recommended by physicians as being more efficacious than without them, and that by some they were ordered in a much coarser condition than what had been sold to the plaintiff. It was admitted by the latter that she had been troubled with tapeworm for several years, had taken medicines of different kinds, and was now free from the parasite; but she alleged not to be able to tell the precise time when she got permanent relief from it, and that at the time in question she was merely suffering from dyspepsia. No other testimony was offered as to her condition previous to taking the ground seeds.

In the charge to the jury the judge stated that the gist of the action was negligence, and that it was for the jury to determine whether the medicine as prepared was a dangerous article, and whether it produced the injury in question, or whether this resulted from a previous use of purgatives, from the enfeebled physical condition of the plaintiff, or from any cause with which the remedy was not connected. The jury returned a verdict for the defendants.

Polarization of Volatile Oils.—Mr. A. M. Todd informs us that a note containing the results of further experiments with pure oils of erigeron and erechthites—in addition to those mentioned on p. 165 of our April number—will be ready for the June number.

OBITUARY.

August Wilhelm Eichler, who died in Berlin, March 2d last, was born April 22d, 1839, at Neukirchen, Hessia, and finished his studies at the University of Marburg, from 1857 to 1860, under Prof. A. Wigand, recently deceased (AM. JOUR. PHAR., 1887, p. 53). In 1861 Dr. Eichler went to Munich as the assistant of Martius, habilitated at that University as lecturer in 1865, and after the death of Martius, became the editor of the *Flora Brasiliensis*. In 1871 he accepted a call as Professor of Botany and Director of the Botanical Garden to the University of Graz, in 1873 to Kiel, and in 1878 to Berlin, where he reorganized the botanical garden, arranged the botanical museum erected in 1880, and continued his labors as Professor of Botany until prostrated by leucæmia about a year ago. He was the author of an excellent work on the morphology of phaenogams published under the title of "Blütendiagramme" (diagrams of flowers), elaborated a large number of natural orders for the *Flora Brasiliensis*, furnished his students with an acceptable "Syllabus of Lectures on Systematic and Medico-Pharmaceutical Botany," and wrote many essays on botanical subjects for various periodicals and for the transactions of different learned societies. The funeral took place from the botanical museum which the deceased savant had built up.

Information has been received of the death of the following graduates of the Philadelphia College of Pharmacy:

Albert E. Brown, of Morris, Ill., Class 1886, died at Los Angeles, Cal., Feb. 3, 1887.

William J. Killingbeck, of Camden, N. J., Class 1880, died at Las Regas, New Mexico, Jan. 13, 1887, aged 29 years.

Harry H. Kneedler, of Gwynedd Township, Montgomery County, Pa., Class 1882, died at the age of 27 years, in Reading, Pa., where he had established a lucrative business.